

# HSCB

## Human Social Culture Behavior Sciences

Robert Bolia, ONRG  
*on behalf of*  
Ivy Estabrooke, ONR



Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE <b>SEP 2010</b>		2. REPORT TYPE <b>N/A</b>		3. DATES COVERED <b>-</b>	
4. TITLE AND SUBTITLE <b>Human Social Culture Behavior Sciences</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>ONR</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release, distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>See also ADA560467. Indo-US Science and Technology Round Table Meeting (4th Annual) - Power Energy and Cognitive Science Held in Bangalore, India on September 21-23, 2010. U.S. Government or Federal Purpose Rights License</b>					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>SAR</b>	18. NUMBER OF PAGES <b>19</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

# Overview

- Operational Environment
- Requirements
- Human, Social, Cultural & Behavioral Sciences Program
- Research Approach
- HSCB Efforts at ONR

# Operational Environment

**U.S. military is capable of providing a unique set of services in response to natural disasters and national emergencies when:**

- **Civilian response capacity is overwhelmed**
- **Civilian authorities request assistance**



**Operations in foreign countries require:**

- **Understanding the social & cultural terrain is key**
- **The ability to adapt behavior to a particular environment.**

# *Why Human Behavior?*

- Military operations other than war depends not just on our military prowess, but also our understanding of such social dynamics as tribal politics, social networks, religious influences and cultural mores
- People, not platforms and advanced technology, will be the key to success in this operational environment
- The forces will need to be patient, persistent, and culturally savvy people to build the local relationships and partnerships essential to achieving a successful outcome

# The Easy Answers –

- **All Behavior (like Gaul) is divided into three parts**
  - Individual
  - Group
  - Societal
- **But even if that is true**
  - The journey from one level to the next is complex, dependent on many exogenous factors – not the least of which is the nature of the leadership and character of the next higher group
- **There are distinct cross-cultural constants**
  - Justice and honor? – okay, but how are they manifested?
- **We may begin with the same neurophysiological makeup**
  - But that becomes modified ethno-linguistically and culturally almost immediately
- **The manner in which we study human behavior is segmented by discipline AND culture**
  - Most Americans are schooled in societies that are grounded in European civilization, but if language forms our thought patterns, the very means we use to study our peoples of other cultures may separate us from the understanding we seek

# Human, Social, Cultural & Behavioral Sciences

## What we do?

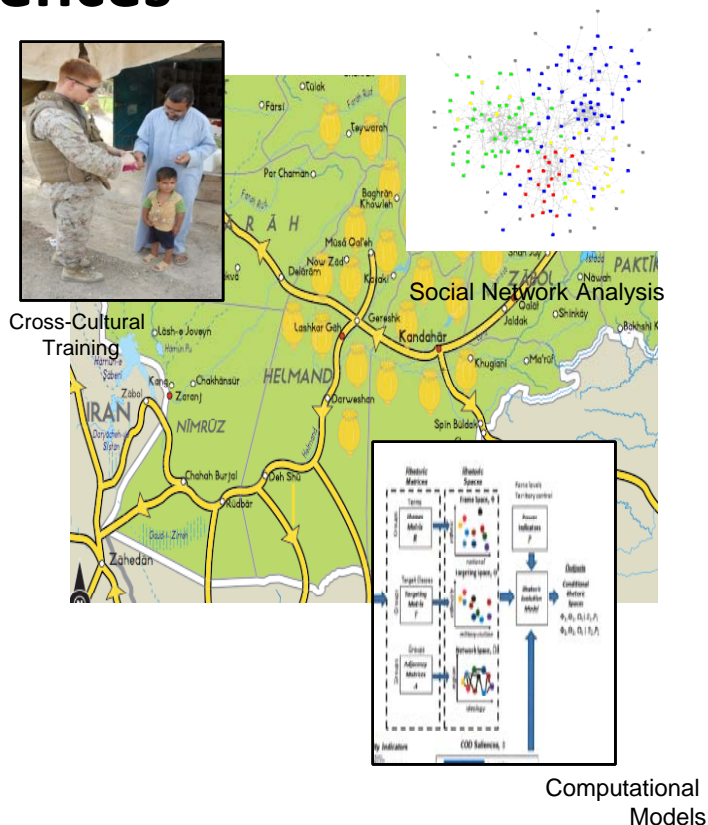
The HSCB Sciences program funds an integrated portfolio of basic to applied research to study influence of cultural, social and cognitive factors on human behavior, develop data collection methods, build computational models, and validate operationally applicable tools.

## Objective

- (1) Develop methods and tools to enable socio-cultural data collection and generation for a range of mission and environmental conditions.
- (2) Develop analysis methods and computational models.

## Key Research and Technology Investment Areas

- (1) Theory and Understanding
- (2) Data Generation
  - a) Methods to collect socio-cultural data in new and austere environments
  - b) Methods and tools to generate data
- (3) Analytics and Modeling
  - a) Analysis techniques and tools to support decision makers
  - b) Computational Models that incorporate socio-cultural data and knowledge
- (4) Socio-Cultural Training & Education
  - a) Methods and materials to support cross-cultural T&E
  - b) Tools for training generalizable cross-cultural skills
  - c) Methods and tools to improve personnel's adaptability in cross cultural





## **New S&T Needed to Meet Capability Gaps**

- Requires multidisciplinary approaches across multiple domains of social, behavioral and computational sciences
- Empirical studies are difficult to conduct
- Human behavior is inherently difficult to understand
- Social science disciplines:
  - “observational” rather than experimental
  - Different disciplines examine different levels of analysis
  - Use largely qualitative data
- Institutional challenges





# A Multidisciplinary Approach

- Economics
- Political Science
- Anthropology
- Psychology
- Sociology
- Religious Studies
- Geography
- Demographics



# HSCB Efforts at ONR

## Modeling Strategic Contexts – 6.2



**PERFORMER:** The University of Chicago

**OBJECTIVE:** Provide methods and tools for the analyses of international conflicts using interactive constraints and affordances in which competing initiatives and campaigns are forged.

**HYPOTHESIS:** Modeling of Strategic contexts (rich, multi-dimensional interactions; e.g., economic, social, political contexts) will more accurately predict areas of potential conflict

**TECHNICAL APPROACH:**

A theoretically shaped and empirically grounded computational model of grand-strategic contexts can be used to generate emergent initiatives, campaigns, scenarios, and policy outcomes. The result will be a better understanding of strategic interaction, and tools that can contribute to more scientifically grounded policies.

# Technical Approach

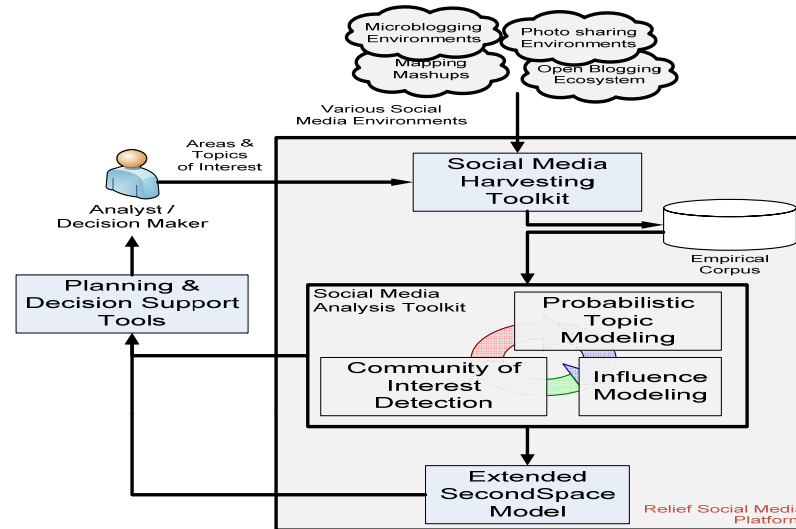
- Prototype strategic scenarios with representative transitions:
  - Provides reference framework for conjuncture modeling
  - Supports alignment tests for scenario convergence assessment
- Construct models of resource-based strategy:
  - Develops orientation structures used in prototype models
- Reciprocal structure/game mapping for state/sub-state actors:
  - Extends the initial prototype models to allow convergence tests involving multigame interactions of selected state/sub-state actors
- Develop discourse mining data framework:
  - Produces an initial platform for the semi-automated capture of a representative text for a fragment repository
- Develop models of dynamic evolution of strategic conjunctures:
  - Extends prototype models to allow credibility assessments of selected strategic dynamics

# Technical Approach (continued)

- Add Multiscale actors and scenarios:
  - Allows prototype models to be assessed relative to actor and state distribution constraints/imputations at multiple levels
- Discourse mining data and model parameters:
  - Uses the discourse mining system to synchronize strategic models in a step-wise realignment
- Integration of models of strategic contexts:
  - Configures and parameterizes strategic models in terms of historical reference cases selected on the basis of conjuncture relevance
- Models of strategic conflicts and their evolutionary trajectories:
  - Supports assessments of robustness and counterfactual probabilities, and their effects on likelihood and risk
- VMS documentation and training courses:
  - Prepares materials on the VMS-DSS strategic decision tool for use in courses for analysts, Subject Matter Experts (SMEs) and managers

**PERFORMER:**  
The University of Chicago

# Understanding RSM: Relief Social Media – 6.2



**PERFORMER:** Lockheed Martin – Advanced Technology Labs

**OBJECTIVE:** Understand and model the use of social media technologies during HA/DR and SSRT situations and the influencing HSCB factors to eventually develop methods and tools for decision makers in these HA/DR, SSTR situations.

**HYPOTHESIS:** Social media systems provide signals of response at the edge not captured by traditional intelligence. Models of these systems can be modeled to emulate their real world dynamics.

## TECHNICAL APPROACH:

- **Harvest Empirical Evidence** - Capture data from social media environments, characterize data sets
- **Create a Computational Model** - Develop an abstract generative network model + concrete model simulator for social media systems
- **Build an Analysis Toolkit** - Integrate new community-of-interest detection, topic modeling, and influence propagation algorithms into a real-time analytic toolkit for social media environments in HADR/SSTR scenarios. Develop military relevant decision support CONOPS for the toolkit.

# Technical Approach

- Harvesting and Computational Tool Development
  - Develop social media harvesting software tools, targetable on a number of aspects: geography, topic, event time, social group, etc.
- Social Media Evidence Harvesting
  - Utilize developed harvesting tools to acquire and analyze HADR / SSTR specific datasets, for specific events of interest, in real-time.
- Computational Model Synthesis
  - Extend generative network models from the literature to capture specific dynamics of SSTR / HADR situations
  - Implement abstract extended models in a “concrete” agent based modeling software toolkit, generate simulated synthetic social media environments
- Social Media Analysis Toolkit
  - Develop proof-of-concept toolsets for derivation of key information from social media systems to support decision making by command teams.
  - Demonstrate proof-of-concepts against synthetic environments

**PERFORMER:**  
Lockheed Martin  
Advanced Technology Labs

# Modeling Outcomes of Coordinated USG and NGO Efforts – 6.2



**PERFORMERS:** eCrossCulture Corporation

**OBJECTIVE:** Develop models and a stand-alone decision making tool which enable USG personnel to anticipate the outcomes of coordinated NGO efforts. Allow the creation of general or AOR-specific operational scenarios.

**HYPOTHESIS:** Modeling USG and NGO SSTR efforts will improve coordination efforts and enhance overall SSTR efforts.

**TECHNICAL APPROACH:**

- Define user requirements: Extensive interviews with USG, NGO, and host-national personnel.
- Design the internal structure of the model: *Reflect real-world behavior*, spheres of influence, uncertainty, adaptability.
- Verification: stand-alone tool field tests in Djibouti; Timor Leste; and Ethiopia.
- Develop “dockable” version: coordinate with other modelers to ensure that our model integrates within a federation of models.



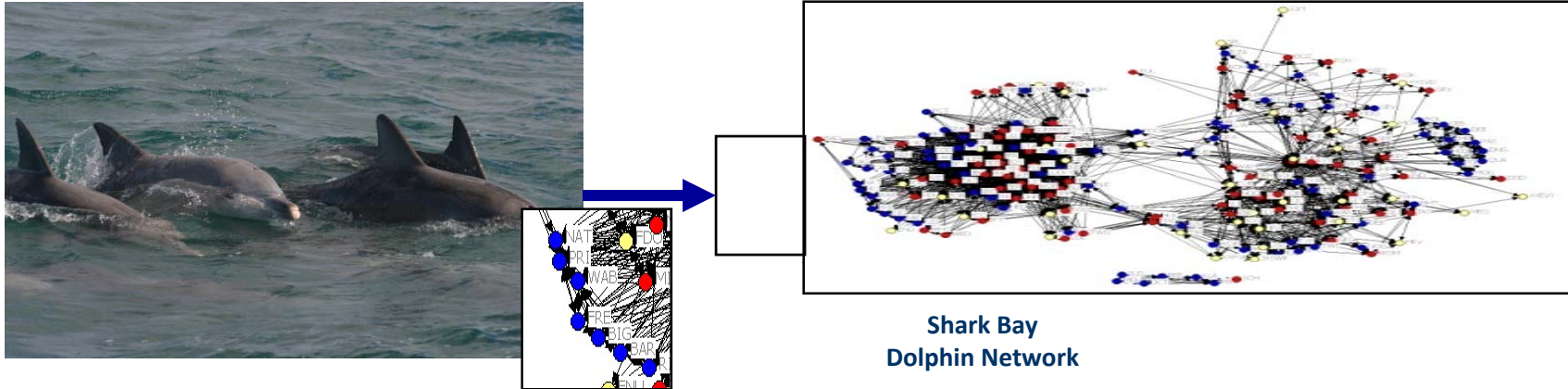
# Technical Approach

- *Front End Analysis*
  - Understand What Users Really Need. Identify potential users, observe their normal processes, discuss deficiencies and solutions. *Involved users have a sense of ownership in the eventual products and will champion their use within various commands.*
  - Understand Past Problems and Anticipate Future Challenges: Interview: NGOs, military, UN orgs, USAID, State Dep. *Create scenarios for development and test which are geographically diverse and organizationally complex.*
  - Collaborate. Work with other ONR contractors to identify technical issues through Technical Interchange Meetings. *Our deliverables must be plug compatible.*



**PERFORMER:**  
eCrossCulture Corporation

# Methods and Algorithms for Gleaning Meaning from Real World Behavioral Dynamic Social Networks



**PERFORMER:** Georgetown University

**OBJECTIVE:** To develop innovative analytic techniques and algorithms to understand behavior in static and dynamic, multi-modal, multi-plexed, multi-attribute social networks with the aim of discovering and validating important features of large unbounded social networks when data are erroneous, ambiguous or incomplete.

## TECHNICAL APPROACH:

- Use real world wild bottlenose dolphin data to develop and validate new methods for accurate analyses and prediction of social network structures based on partial data.
- Test robustness with sensitivity analysis, i.e., strategically remove network subgraphs to assess the impact on different network measures.
- Develop algorithms to identify unknown or hidden substructures across large numbers of features and relations.
- Capture changing group structures and emerging actor alliances in dynamic social networks.

# Technical Approach

- Investigate Sensitivity Analysis and Other Methods for Coping with Inaccurate, Ambiguous and Incomplete Data
- Investigate Biological:
  - What dolphin attributes or observer attributes contribute to data ambiguity or incompleteness?
  - Does focal sampling more accurately depict individual social structures and networks than the widely used survey method?
- Investigate Sociological:
  - Theoretical and empirical work to determine the usefulness of traditional social network analysis on an open system
  - Extensions to social network analysis for open systems containing incomplete, ambiguous and uncertain data.
- Develop algorithms for pruning networks and Insertion algorithm that recognizes structural changes
- Develop measures to help assess sampling biases

**PERFORMER:**  
Georgetown University

# Technical Approach (continued)

- Dynamic Analysis of Multi-Modal, Multi-Featured Social Networks
- Investigate Biological:
  - How network patterns change during development and predict individual survival and reproduction
  - Patterns of information transmission and the attributes of individuals that either innovate or copy others
  - What hierarchical structures characterize the network
  - What factors determine the formation, maintenance, and dissolution of actor alliances in the network
- Investigate Sociological:
  - Develop robust social network models for analyzing dynamic networks
- Develop graph mining algorithms for community detection in the context of dynamic, networks
- Develop algorithms for identifying emerging and stable actor alliances
- Develop indices that support sophisticated analysis of large, dynamic networks

**PERFORMER:**  
Georgetown University